

Application Serial No.:
09/930,718

Attorney Docket No.:
SP00-231A

REMARKS

In view of the above amendments and the following remarks, favorable reconsideration of the outstanding Office Action is respectfully requested.

Claims 2-5, 9 and 15 remain unchanged in the application. Claims 1, 6-8, 13, 14, 16-19, 22 and 23 are currently amended in this paper. New claims 27-57 are added. Claims 10-12 are canceled without prejudice. Claims 20, 21 and 24-26 have been canceled without prejudice in response to a restriction requirement, which is now final. Applicants retain the right to file a divisional application for these canceled claims.

A Declaration under 37 C.F.R. § 1.132 by Dr. Roger J. Araujo, one of the joint inventors in this application, is submitted herewith in support of the patentability of certain relevant claims in the application.

1. Allowable Subject Matter

Applicants note with appreciation that the Examiner has indicated that claims 6-8, 22 and 23 would be allowable if rewritten in independent form including all limitations of the base claim and any intervening claims, provided that any rejections under 35 U.S.C. § 112 are obviated.

The reason for the allowability of the above claims include, among others, the ones stated by the Examiner in the Office action:

The prior art fail to disclose or suggest the further restriction of requiring the addition of the recited components as recited in claims 6-8. Additionally, the prior art fails to disclose or suggest a lens or a gradient index lens made from the glass as recited in instant claims 1 and 10.

Applicants submit that there may be other reasons for the allowability of these claims. Since these reasons are sufficient, Applicants do not present other reasons herein.

Applicants submit that in this paper, claim 6 has been amended to include all its base claims and intervening claims, and that claim 6 is not unpatentable over 35 U.S.C. § 112. Therefore, claim 6 is now in condition for allowance.

Claims 7 and 8, dependent from claim 6, as amended herein, shall be in condition for allowance, as well.

Applicants submit that in this paper, claim 22 has been amended to include all limitations of its base claims and intervening claims, and that claim 22 is not unpatentable under 35 U.S.C. § 112. Thus, claim 22 shall now be in condition for allowance.

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Applicant submit that in this paper, claim 23 has been amended as follows:

23. (*Currently Amended*) A gradient index lens formed by subjecting ~~the glass of claim 10~~ a batch-melted borosilicate glass essentially free of metallic silver (Ag^0) to an ion-exchange process, said glass being made by melting a batch containing at least 2 cation percent silver.

This claim shall be in condition for allowance inasmuch as the Examiner has concluded that "the prior art fails to disclose or suggest a lens or a gradient index lens made from the glass as recited in instant claims 1 and 10." It follows that the prior art fails to disclose or suggest the gradient index lens as claim in the claim 23, as amended herein.

Applicants have added new claims 27-36 to be dependent from claim 22, as amended herein. Since claim 22 is in condition for allowance, Applicants submit that claims 27-36 are in condition for allowance as well.

Applicants have added new claims 37-46 to be dependent from claim 23. Since claim 23 is in condition for allowance, as indicated supra, claims 37-46 are in condition for allowance as well.

It is believed that such amendments to the claims above do not introduce new matter into the application.

Applicants have further added new claims 47-57 directed to ion-exchanged silver borosilicate glasses. The sole independent claims in this group, claim 47, is reproduced as follows:

47. (*New*) A batch-melted borosilicate glass produced by melting a batch containing a high concentration of silver of at least 2 cation percent, said glass being essentially free of metallic silver (Ag^0), and part of the Ag ions (Ag^+) has been replaced by less polarizable monovalent ions by the process of ion exchange.

Applicants first submit that this newly added group of claims, claims 47-57, do not introduce new matter into the application because the application discloses such silver borosilicate glass after ion-exchange.

Applicants believe that this group of claims are in condition for allowance as well because the prior art references of record do not disclose such ion-exchanged silver borosilicate glass compositions.

2. Rejections under 35 U.S.C. § 112

The Examiner has rejected claims 1-11 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention.

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In particular, with regard to claim 1, the Examiner asserted that the use of the term "high silver" rendered claim 1 indefinite. In the relevant portion of the Detailed Action, the Examiner opined that

The term "high silver" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. While the specification refers to the term "high silver" on page 4, lines 3-4 as to comprising at least 2 cation percent, it also refers to a glass having a high concentration of silver on page 7, lines 21-25 as greater than 1 cation %. This renders the claims indefinite since it unclear how much silver is required to be a "high silver" glass.

Applicants respectfully traverse this rejection.

The Examiner correctly pointed out that in page 4, lines 3-4 of the present application, a definition of the term "high silver" is provided. This part clearly sets forth that "[b]y 'high-silver,' we mean borosilicate glass made by melting a batch containing at least 2 cation percent silver."

It is the Examiner's view that the page 7, lines 21-25 description is inconsistent with the above definition of the term "high silver," and it is this inconsistency that renders claim 1 indefinite. We respectfully disagree.

The relevant part of page 7, lines 21-25 is reproduced as follows: "[t]hus, we were able to demonstrate that borosilicate glass with a high refractive index resulting from a high concentration of silver ions can be fabricated by melting a batch containing a high concentration ($\gg 1$ cation percent) of silver salt." Applicants submit that the range " $\gg 1$ " is not equal to "greater than" as interpreted by the Examiner. Applicants submit that the range " $\gg 1$ " is not inconsistent with "at least 2." In this paragraph of the application, Applicants do not intend to modify the definition of term "high silver" in page 4, lines 3-4. A patent applicant shall be free to be his own lexicographer in the application, as long as the definition of a term is not repugnant to the common meaning. The meaning of the claim shall be construed in light of the specification. Therefore, it is clear, by reading the whole specification, what the term "high silver" stands for.

Nonetheless, claim 1 of the present application, as amended herein, no longer contains the term "high silver." Thus the issue is moot.

However, the term "high silver" or "high-silver" may be used in other claims. Applicants submit that such use of this term in the claims does not infringe 35 U.S.C. § 112, because the meaning of this term is defined in page 4, lines 3-4.

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With regard to claim 11, the Examiner asserted that the use of the terms "high refractive index" and "negligible attenuation" causes claim 11 indefinite.

This issue is moot since Applicants have canceled claim 11 without prejudice.

3. Rejection under 35 U.S.C. § 102

The Examiner has rejected originally filed claims 1-5, 9, 11 and 13 under 35 U.S.C. § 102(b) as being anticipated by G.E. Rindone, "The Spontaneous Growth of Silver Films on Glasses of High Silver Content," Journal of the Society of Glass Technology, Volume XXXVII, pages 124-28 (June 1953) (hereafter Rindone).

The Examiner asserted that

Rindone discloses a batch melted, ionic silver borosilicate glass having a composition, which anticipates claims 1-5, 9 and 11. See page 125, lines 1-11 and page 127, lines 31-38. Rindone discloses a clear colorless glass that anticipates the transparent limitation of claim 11 and 13. See page 125, lines 4-5 and page 127, lines 31-38.

Since the composition of the reference is the same as those claimed herein it follows that the glasses of Rindone would inherently possess the same refractive index and attenuation properties as recited in claim 11.

Page 3 of the Detailed Action.

Applicants have amended claim 1 herein as follows:

1. (*Currently Amended*) A batch-melted, ~~high ionic silver~~, borosilicate glass essentially free of metallic silver (Ag^0), made by melting a batch comprising, in cation percent, 15-60 SiO₂, 10-30 Al₂O₃, 10-45 B₂O₃, and 8-25 Ag₂O.

Applicants note that this rejection is not made of originally filed claim 12, which is canceled herein without prejudice. Originally filed claim 12 contains the limitation that "wherein the batch comprises, in cation percent, 15-60 SiO₂, 10-30 Al₂O₃, 10-45% B₂O₃, and 8-25 Ag₂O." This limitation is now introduced into claim 1, as amended herein. Therefore, the above rejection of claim 1 is obviated.

Claims 2-5, 9 and 13, now dependent from claim 1, should not be subject to this rejection, either.

Claim 11 has been canceled without prejudice.

Applicants respectfully submit that the above amendments do not represent an admission of the Examiner's above rejections.

4. Rejections under 35 U.S.C. § 103

(1) The Rindone rejection

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The Examiner has rejected claims 10, 12 and 14-19 under 35 U.S.C. § 103(a) as being unpatentable over Rindone, above.

The Examiner asserted that

Rindone discloses a batch melted, ionic silver borosilicate glass, which anticipates instant claims 1-5, 9, 11 and 13. See above rejection, page 125, lines 1-11 and page 127, lines 31-38. Rindone teaches the glass in terms of weight percent. See page 125, lines 7-11.

Rindone differs from the instant application by not teaching any example sufficiently specific to anticipate the compositional limitations of claims 10, 12 and 14-19.

However, it is believed that the weight percent ranges disclosed by Rindone if converted to cation percent would have overlapping compositional ranges with instant claims 10, 12 and 14-19. See page 125, lines 7-11. Overlapping ranges have been held to establish prima facie obviousness. MPEP 2144.05.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected from the overlapping portion of the ranges disclosed by the reference because overlapping ranges have been held to establish prima facie obviousness. See MPEP 2144.05.

Page 4 of the Detailed Action.

Applicants have amended claim 1 as indicated supra. Since claim 1, as amended herein, incorporates the limitations of the originally filed claim 12, which has been canceled herein without prejudice, the above rejection of claim 12 is carried over to claim 1, as amended herein.

Applicants respectfully traverse this rejection.

A. The Rindone reference does not establish a prima facie obviousness case.

A proper prima facie case of obviousness requires the examiner to satisfy three requirements. First, the prior art relied upon, coupled with knowledge generally available to one of ordinary skill in the art, must contain some suggestion which would have motivated one of ordinary skill to combine references. See In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Second, the examiner must show that, at the time the invention was made, the proposed modification had a reasonable expectation of success. See Amgen v. Chugai Pharm. Co., 927 F.2d 1200, 1209, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991). Finally, the combination of references must teach or suggest each and every limitation of the claimed invention. See In re Wilson, 424 F.2d 1832, 1385, 165 USPQ 494, 496 (CCPA 1970). Moreover, both the suggestion and the reasonable expectation of success must be found in the prior art, not in the applicant's disclosure. In re Vaeck, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991).

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First of all, Rindone does not teach or suggest each and every limitation of the invention as claimed in claim 1, as amended herein. Rindone does not specify the composition range of the aluminoborosilicate silver glass of claim 1, as amended, of the present application. Rindone does not disclose a particular borosilicate silver glass composition, much less a particular aluminoborosilicate silver glass composition. As Applicants pointed out in previous submission, the glass compositions as investigated in Rindone for the metallic film formation property are only borate silver glasses.

Second, whereas Rindone provides an aluminoborosilicate silver glass in a very broad range, as the Examiner noted, in page 125, lines 5-12, Rindone does not provide the motivation or suggestion as to modify this broad glass composition range to achieve the glass composition range of claim 1, as amended, of the present application. And, indeed, from Rindone, one of ordinary skill in the art could not expect reasonable success by modifying the broad glass composition of Rindone.

As is pointed out by Dr. Araujo in the Declaration under 37 C.F.R. § 1.132:

According to my expertise in glass science and technology, it is my understanding that there is no suggestion in the Rindone paper that high silver can be obtained in a glass that contains a high enough level of silica to produce a chemically durable glass. Although Rindone discloses a glass composition range, it gives no hint about how the limits depend on the other components. For example, Rindone mentions that silver oxide in the range of 5 to 60 wt% leads to film formation. It also mentions limits of silica from 0 to 60 wt%. That would seem to imply that a glass containing 60 wt% silica and 5% silver could be made. Rindone gives no hint about the conditions that would make this possible. Rindone certainly does not publish the composition of any borosilicate glass. In fact, regarding glasses containing silica, what is mentioned in Rindone is a silica glass containing 0.2% silver was made which produced metallic silver film on its surface. 0.2% by weight is a long way down from 2 cation percent of silver. In fact, many glasses can be made with that level of silver. All these low-level silver glasses differ substantially from what is claimed in claim 1, as amended, in the present application.

Item 7, Declaration under 37 C.F.R. § 1.132 by Dr. Araujo.

The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. In re Fritch, 23 U.S.P.Q.2d 1780, 1783-84 (Fed. Cir. 1992). The Examiner did not, and is unable, to point to any place in Rindone where it suggests or provides a motive to modify the Rindone glass composition to obtain the silver aluminoborosilicate glass having the composition as defined in claim 1, as amended herein.

B. The evidence of unexpected results rebuts any prima facie case of obviousness.

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Even assuming, arguendo, that Rindone could have established a prima facie obviousness case of the invention as claimed in claim 1, as amended herein, which they can not, such case is rebutted by the evidence of unexpected results achieved by the present invention. See In re Blauwe, 736 F.2d 699, 222 USPQ 191 (Fed. Cir. 1984).

Rindone discloses silver-containing glasses, particularly silver borate glasses, which are prone to the formation of a metallic silver film on the surface of the glass when exposed to water vapor, such as the water vapor in ambient air when the glass is placed in ambient air, especially when the glass is at the same time subject to light radiation, particularly UV light.

According to Dr. Araujo:

The glasses taught in Rindone are prone to metallic silver film formation on the surface when exposed to water vapor, especially when subjected to light radiation at the same time. According to my expertise, these glasses thus do not have the chemical durability required for many applications where the glass is exposed to ambient air.

Item 8, Declaration under 37 C.F.R. § 1.132 by Dr. Araujo.

However, Dr. Araujo has demonstrated by experiments that glasses having compositions falling within claim 1, as amended, of the present application are stable in the presence of water vapor in ambient air and when exposed to light radiation. No metallic silver film formed on the surface of the glass samples of the present invention as tested by Dr. Araujo, after prolonged exposure to water vapor in ambient air and light radiation. This is clearly contrary to the teaching of Rindone. Therefore, the glass as claimed in the present application are suitable for many applications which requires the glass to be exposed to ambient air, where the Rindone glass cannot be used. See Items 9 and 10, Declaration under 37 C.F.R. § 1.132 by Dr. Araujo.

Furthermore, Dr. Araujo has demonstrated by experiments that glasses having compositions falling within the Rindone composition but outside of the composition of claim 1, as amended, of the present application, do not have the chemical durability to withstand the chemical environment of a molten salt bath used in an ion-exchange process. Therefore, these Rindone glasses are not suitable for the production of gradient index material by ion-exchange. See Item 10, Declaration under 37 C.F.R. § 1.132 by Dr. Araujo.

However, the inventors have demonstrated by experiment that an aluminoborosilicate glass of the present application does have the chemical durability to withstand the chemical environment of a molten salt batch used in an ion-exchange process. Therefore, the glass of the present invention has the advantage of being capable of ion-exchanging to gradient index

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material. As discussed in the present application, such gradient index materials can be used in many applications. Such gradient index materials can be used for the production of gradient index lenses, for example. See page 11, lines 4-31, of the present application.

In addition, Dr. Araujo has demonstrated that many glasses as taught in Rindone are not suitable for use in optical applications because (i) the glasses have low chemical durability in ambient air; and/or (ii) the glasses contain metallic silver slugs; and/or (iii) the glasses do not have the required surface quality or mechanical strength. See Item 10, Declarations under 37 C.F.R. § 1.132 by Dr. Araujo.

Therefore, Applicants submit that the silver aluminoborosilicate glass as claimed in claim 1, as amended herein, of the present application, is not obvious over the Rindone teaching. Applicants respectfully request the Examiner to withdraw this rejection.

Other claims affected by this rejection, claims 10 and 14-19, are all amended to depend from claim 1, as amended herein. Thus they are not obvious over Rindone for the same reasons. They may be unobvious over Rindone for other reasons. Since the above reasons are sufficient to obviate the rejections under 35 U.S.C. § 103 by the Examiner of these claims, Applicants do not herein expound on other reasons.

(2) The Armistead Rejection

The Examiner has rejected claims 1-3, 9, 11, 13-17 and 19 under 35 U.S.C. § 103(a) as being unpatentable over Armistead (United States Patent No. 4,075,024).

Applicants note that the Examiner did not direct this same rejection to originally filed claim 12.

Since claim 1, as amended herein, incorporates the limitations of claim 12 as originally filed, these rejections are not applicable for claim 1, as amended herein.

Claim 11 has been canceled without prejudice.

Since claims 2-3, 9, 13-17 and 19 are now all dependent from claim 1, as amended, this rejection is no longer applicable.

Applicants submit that the above amendments do not represent an admission of the Examiner's above rejections of these claims.

(3) The Nakada Rejection

The Examiner has rejected claims 1-5, 9, 11-13, 16 and 17 under 35 U.S.C. § 103(a) as being unpatentable over Nakada (Japanese Patent Publication No. 2000-302478).

The Examiner asserted that

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Nakada teaches a borosilicate glass comprising silver in terms of weight percent. See Abstract and paragraph [0004], [0007]. Nakada teaches that the glass has refractive index from 1.57-1.63. See paragraphs [0027] and [0029].

Nakada differs from the instant application by not teaching any example sufficiently specific to anticipate the compositional limitations of claims 1-5, 9, 11-13, 16 and 17.

However, it is believed that the weight percent ranges disclosed by Nakada if converted to cation percent would have overlapping compositional ranges with instant claims 1-5, 9, 11-13, 16 and 17. See Abstract and paragraphs [0004] and [0007]. Overlapping ranges have been held to establish prima facie obviousness. MPEP 2144.05.

Page 6 of the Detailed Action.

As noted above, Applicants have amended claim 1 to incorporate the limitations of originally filed claim 12, and all claims 2-5, 9, 13, 16 and 17 are now dependent from claim 1, as amended. Claims 11 and 12 have been canceled without prejudice. Therefore, the above rejection may still be applied to claims 1-5, 9, 13, 16 and 17, as amended.

Applicants respectfully traverse this rejection.

The Nakada reference does not establish a prima facie obviousness case against claim 1, as amended.

First, whereas Nakada provides an aluminoborosilicate silver glass in a very broad range, Nakada does not provide the motivation or suggestion as to modify this broad glass composition range to achieve the glass composition range of claim 1, as amended, of the present application. And, indeed, from Nakada, one of ordinary skill in the art could not expect reasonable success by modifying the broad glass composition of Nakada.

Second, Nakada does not teach or suggest each and every limitation of the invention as claimed in claim 1, as amended herein. Nakada does not specify the composition range of the aluminoborosilicate silver glass of claim 1, as amended, of the present application. Nakada does not disclose a particular aluminoborosilicate silver glass composition falling within the compositional range of claim 1, as amended. All of the glass examples in Nakada has silver less than 8 cation percent.

The Examiner asserted that the glass compositions as disclosed in Nakada, in weight percent, when converted to cation percent, would have overlapping ranges with what is claimed in claim 1, as amended, of the present application. Applicants respectfully disagree. Indeed, the glass compositions, as taught in Nakada, contain at most 5 wt% Ag₂O. This glass cannot contain silver in cation percentage of 8% or higher, while 8% being the minimal limit

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of the silver content in the glass composition of claim 1, as amended, of the present application.¹

Therefore, contrary to the Examiner's assertion, there is no overlap between the compositional range of claim 1, as amended, of the present application and that of Nakada.

The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." In re Fritch, 23 U.S.P.Q.2d 1780, 1783-84 (Fed. Cir. 1992). The Examiner did not, and is unable, to point to any place in Nakada where it suggests or provides a motive to modify the Nakada glass composition to obtain the silver aluminoborosilicate glass having the composition as defined in claim 1, as amended herein.

Applicants respectfully request the Examiner to withdraw the above rejections under 35 U.S.C. § 103(a) over Nakada.

5. Conclusion

Based upon the above amendments, remarks, and papers of record, Applicants believe the pending claims of the above-captioned application are in allowable form and patentable over the prior art of record. Applicants respectfully request reconsideration of the pending claims 1-9, 13-19, 22, 23 and 27-57 and a prompt Notice of Allowance thereon.

Applicants believe that no extension of time is necessary to make this Response timely. Should Applicants be in error, Applicants respectfully request that the Office grant such further time extension pursuant to 37 C.F.R. § 1.136(a) as necessary to make this

¹ In reaching this conclusion, Applicants calculated the cation percentage of silver in the following hypothetical glass composition:

Component	SiO ₂	B ₂ O ₃	R ₂ O	Al ₂ O ₃	TiO ₂	La ₂ O ₃	Ag ₂ O	BaO	Σ
wt	10	10	0	0	0	0	5.0	35	60.0
% Cation	24.2	39.0	0	0	0	0	5.8	30.9	99.9

Nakada discloses, broadly, that the glass may have a composition, by weight, of 10-50% SiO₂, 10-54% B₂O₃, 0-20% R₂O (including one or more of Li₂O, Na₂O and K₂O), 0-20% Al₂O₃, 0-10% TiO₂, 0-10% La₂O₃, 0.1-5.0% Ag₂O, 35-60% RO (including one or more of ZnO, BaO, CaO and MgO). See Abstract of Nakada.

Note in the design of the above glass composition, Applicants chose, from the compositional range of Nakada, (i) the lowest amounts by weight of all possible components other than Ag₂O, (ii) the highest possible amount of Ag₂O by weight, and (iii) BaO from among BaO, CaO, MgO and ZnO, so that the cation percentage of Ag is maximized.

Note also that the above glass does not exist insofar as the sum total of the weight percentage of SiO₂+B₂O₃+Ag₂O+BaO is only 60%.

Therefore, the cation percentage of silver in any real glass as taught in Nakada should be smaller than the silver cation percentage calculated from the above hypothetical glass, which is 5.8%.

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Response timely, and hereby authorize the Office to charge any necessary fee or surcharge with respect to said time extension to the deposit account of the undersigned firm of attorneys, Deposit Account 03-3325.

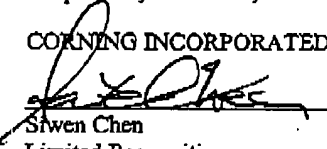
The undersigned attorney is granted limited recognition by the Office of Discipline and Enrollment of the USPTO to practice before the USPTO in capacity as an employee of Corning Incorporated. A copy of the document granting such limited recognition either is submitted herewith or has been submitted previously for the record.

Please direct any questions or comments to the undersigned at (607) 248-1253.

Respectfully submitted,

CORNING INCORPORATED

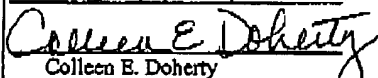
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